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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,810	02/27/2004	Evgueni Goldberg	CA7031042001	5639

23639 7590 05/04/2006

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EXAMINER	
ALLEN, NICOLE L	

ART UNIT	PAPER NUMBER
2129	

DATE MAILED: 05/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/789,810	GOLDBERG ET AL.	
	Examiner	Art Unit	
	Nicole L. Allen	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-50 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-17,21,24-29,31-37,49 and 50* is/are rejected.

7)☒ Claim(s) *8,18-23,38 and 48* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 8, 38, and 48 are objected to because of the following informalities: The claim limitation state" the activity counters are periodically divided by a constant greater than one". The examiner does not understand why the activity counter would be periodically divided by a constant if the activity counter is used to count the unassigned variables and is incremented each time an unassigned variable appears.

2. Claims 18 and 21 are objected to because of the following informalities: Claim 18 states "one or more conflict clause removed from the stack is near the bottom". Claim 21 states "one or more conflict clause removed from the stack is near the top". The examiner does not understand how the conflict clause can be removed from near the bottom as well as near the top. If the clauses are removed from near the bottom as well as from near the top, nothing will be remaining in the stack. Claims 19, 20, 22, and 23 are also objected to because of the dependencies. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> *The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.*

Claim 25 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the i inventor(s), at the time the application was filed, had possession of the claimed invention

Claim 25 states" wherein no less than a specified part" of the conflict clauses in the stack are removed. The specification does not enable one skill in the art or the examiner to connect the phrase to the invention. A description of the phrase should be provided.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> *A person shall be entitled to a patent unless –*
>
> *(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.*

Claims 1-7, 9-17, 21, 24,26-29, 31-37, 39-47, 49-50, rejected under 35 U.S.C. 102(b) as being anticipated by Marques-Silva ("GRASP: A Search Algorithm for Propositional Satisfiability").

As per claims 1, 31 and 41, Marques-Silva teaches a method of solving satisfiability problems, the method comprising:

a) organizing a plurality of clauses in a satisfiability problem as a chronologically ordered stack comprising a top and a bottom, wherein newly deduced conflict clauses are added to the top of the stack

b) selecting a branching variable from a plurality of unassigned variables in the satisfiability problem;

c) assigning value 0 or 1 to the selected branching variable;

d) marking literals set to 0

e) invoking Boolean Constraint Propagation when the stack comprises one or more unit clauses;

f) repeating (b)-(e) when the stack only comprises one or more non-unit clauses;

g) returning a solution if a solution is found (Page 511 Figure 2; the examiner reads the algorithm returns a result either "success" or "failure")

The examiner reads the clause database as a stack because it holds data in a list. The examiner reads that Figure 2 is code that incorporates all the steps described above (Section 2.4, page 508)

As per claim 2, 32 and 42, Marques-Silva teaches the method of claim 1, wherein the stack comprises at least one initial clause (Section 2.4, page 508; the examiner reads "w" as the initial clause) and at least one conflict clause (Section 3, page 509; the examiner reads "wc(k)" as the conflict clause.

As per claims 3, 33 and 43, Marques-Silva teaches the method of claim 2, wherein at least one initial clause is located below the at least one conflict clause in the stack (The initial clause is below the conflict clause because the initial clause is in the database (stack) before a conflict arise.)

As per claims 4, 34 and 44, Marques-Silva teaches the method of claim 1, wherein the branching variable is selected from among a set of unassigned variables in the clause on top of the stack when the top clause is a conflict clause (Section 2.5, page 509; the examiner reads that the branching variable is selected using the Search function).

As per claims 5, 35 and 45, Marques-Silva teaches the method of claim 1, further comprising maintaining an activity counter for each unassigned variable (Section 2.5, page 509; the examiner reads "d" as being the activity counter because it is incremented every time the search function is called).

As per claims 6, 36 and 46, Marques-Silva teaches the method of claim 5, wherein the activity counter of an unassigned variable is incremented each time the unassigned variable appears in a clause

used when generating a conflict clause (Section 2.5, page 509; the examiner reads"d" as being the activity counter because it is incremented every time the search function is called "d+1".

As per claims 7, 37 and 47, Marques-Silva teaches the method of claim 5, wherein the selected branching variable composes an activity counter with the highest value (Page 511, equation (7); the examiner reads the decision level ("B") as the counter. "B" is the highest decision level and is calculated using equation 7.

As per claims 8, 38 and 48 We method of Claim 5, wherein the activity counters are periodically divided by a
constant greater than one.

As per claims 9, 39 and 49, Marques-Silva teaches the method of claim 1, wherein whether 0 or 1 is assigned to the selected branching variable depends upon costs associated with the positive and negative literals of this variable (Section 2.1, page 507; the examiner reads that the literal can be the occurrence (cost) of a variable or its complement).

As per claim 10, 40 and 50, Marques-Silva teaches the method of claim 9, wherein the cost of a literal is equal to the total number of conflict clauses containing the literal (Section 2.1, page 507; the examiner reads that the literal can be the occurrence (cost) of a variable).

As per claim 11, Marques-Silva teaches the method of claim 9, wherein the cost of a literal is equal to the total number of binary clauses containing the literal plus, for each binary clause containing the literal, the total number of binary clauses containing an opposite of the other literal in the binary clause (Section 2.1, page 509; the examiner reads that the literal is the occurrence of a variable or its complement, which is the opposite).

As per claim 12, Marques-Silva teaches the method of claim 9, wherein, if there is at least one unsatisfied conflict clause, the selected branching variable is assigned value 1 if the cost associated with the positive literal of this variable is higher than the cost associated with the negative literal (Fig. 3; the examiner reads that "x" can either be set to 1 or zero).

As per claim 13, Marques-Silva teaches The method of claim 9, wherein, if there is at least one unsatisfied conflict clause, the selected branching variable is assigned value 0 if the cost associated with the negative literal of this variable is higher than the cost associated with the positive literal (Fig. 3; the examiner reads that "x" can either be set to 1 or zero).

As per claim 14, Marques-Silva teaches The method of claim 9, wherein, if all conflict clauses are satisfied, the selected branching variable is assigned value 0 if the cost associated with the positive literal of this variable is higher than the cost associated with the negative literal (Fig. 3; the examiner reads that "x" can either be set to 1 or zero).

As per claim 15, Marques-Silva teaches the method of claim 9, wherein, if all conflict clauses are satisfied, the selected branching variable is assigned value 1if the cost associated with the negative literal of this variable is higher than the cost associated with the positive literal (Fig. 3; the examiner reads that "x" can either be set to 1 or zero).

As per claim 16, Marques-Silva teaches the method of claim 1, further comprising: maintaining an activity counter for each conflict clause (Fig. 2, page 511; the examiner reads "d" as the counter because it keeps track of the decision level and it is incremented when the clause database is updated) removing one or more conflict clauses from the stack (Fig 2; the examiner reads the code presented in figure 2 has a Erase function).

As per claim 17, Marques-Silva teaches the method of claim 16, wherein the activity counter of a conflict clause is incremented each time the conflict clause is used when generating another conflict clause (Fig. 2, page 511; the examiner reads "d" is incremented when the clause database is updated and a new search is processed).

As per claim 21, Marques-Silva teaches the method of claim 16, wherein at least one of the one or more conflict clauses removed from the stack is near the top of the stack (Section 3.1, page 510; the examiner reads that a conflict clause database is augmented with the clause database and the clause is erased at the current decision level which is near the top0.

As per claim 24, Marques-Silva teaches the method of claim 16, wherein the one or more unsatisfied conflict clauses removed from the stack do not include the clause at the top of the stack (Page, 511, Fig 2; the examiner reads that during the backtracking phase, the top conflict is never removed because the search process backtracks to the preceding level "B-1".

As per claim 26, Marques-Silva teaches the method of claim 16, wherein the top conflict clause of the stack is never removed (Page, 511,Fig 2; the examiner reads that during the backtracking phase, the top conflict is never removed because the search process backtracks to the preceding level "B-1".

As per claim 27, Marques-Silva teaches the method of claim 1, further comprising:

a) invoking reverse Boolean Constraint Propagation when a conflict arises

b) deducing a new conflict clause (Section 2.5, Number 2, Page 509)

c) returning the answer "no solution" if this clause is

empty or adding the newly deduced conflict clause to the top of the stack otherwise.

(The examiner reads Figure 2 as code that describes the steps presented above. The examiner reads the steps described above as "backtracking", which is described on page 510, section 3.1.2)

As per claim 28, Marques-Silva teaches the method of claim 27, wherein a conflict arises when all literals in one of the plurality of clauses are set to 0 as a result of one or more assignments of value (Fig. 2; the examiner reads that the free literals in the clause can be set to zero as a result of the assignments of value. The literals are either set to zero, or the complement)

As per claim 29, Marques-Silva teaches the method of claim 27, wherein back tracking is non-chronological (Page 511; the examiner reads the search process back tracks non-chronologically by jumping back over several levels).

As per claim 30, Marques-Silva teaches the method of claim 1, further comprising:
starting a new search tree when more than a threshold number of conflict clauses have been deduced or more than a threshold number of unit conflict clauses have been deduced (Looking at Figure 2, If a conflict arises, the erase function gets called, and the process starts over again, therefore a new search has been invoked on a new tree)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole L. Allen whose telephone number is (571) 272-5830. The examiner can normally be reached on Monday-Friday 7:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent can be reached on (571) 272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

4/29/06

David Vincent
Supervisory Patent Examiner

NLA